

Attorney Docket No.: RO0006US.NP
Inventors: Sheu et al.
Serial No.: 10/580,803
Filing Date: November 24, 2006
Page 3

Amendments to the Specification:

Please replace the abstract of the disclosure with the following rewritten abstract:

--Disclosed are hydrophilic choline/N-heterocycle ester compounds containing single amino acids, peptides, or derivatives thereof which have the potential to express anti-oxidant activity capable of reducing reactive oxygen species in cells. These compounds may be used to inhibit oxidative stress-induced cell injury or death both *in vivo* and *ex vivo*. In addition, methods for the synthesis of these compounds are disclosed.--

Please replace the paragraph beginning at line 5 of page 1 with the following rewritten paragraph:

--[0001] This application claims benefit of PCT/US2004/039739, filed November 26, 2004, which claims benefit of U.S. Provisional Patent Application Serial No. 60/524,833, filed November 25, 2003, which is hereby incorporated by reference in its entirety.--
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Please replace the paragraphs beginning at line 3 of page 5 with the following rewritten paragraphs:

--[00011] Figure 1 shows a method for the synthesis of N-acetyl L-cysteine choline ester (compound 13), L-cysteine choline ester (compound 14) and its derivative (D)-2- (trimethylamino) ethyl-2,2-dimethylthiazolidine-4-carboxylate (compound 15). a: to 9, DCC, and 4-dimethylamino pyridine/4-dimethylamino pyridinium chloride in CH₂Cl₂, was added 2-bromo-ethanol with stirring for

Attorney Docket No.: RO0006US.NP
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Serial No.: 10/580,803
Filing Date: November 24, 2006
Page 4

12 hours at room temperature. Trimethylamine was subsequently added to the resulting solution of 2-acetylamino-3-tritylsulfanyl-L-propionic acid 2-bromo-ethyl ester in THF with stirring for 48 hours at room temperature. **b**: to **10**, DCC, 4-dimethylamino pyridine and 4-dimethylamino pyridinium chloride in CH₂Cl₂ was added 2-(dimethylamino) ethanol with stirring for 12 hours at room temperature. Methyl iodide was subsequently added to the resulting solution of 2-tert-butoxycarbonylamino-3-tritylsulfanyl-L-propionic acid 2-dimethylamino-ethyl ester in THF with stirring for 12 hours at room temperature. **c**: to **11** or **12** in CH₂Cl₂ was added Et₃SiH and anhydrous CF₃COOH with stirring at room temperature for 1 hour. **d**: acetone.

[0012] Figure 2 shows a method for the synthesis of glutathione choline ester. **a**: to **1** in DMF was added S-trityl-L-cysteine and triethylamine with stirring at room temperature for 12 hours. **b**: to **3**, DCC, and triethylamine in CH₂Cl₂ was added 2-(dimethylamino)-ethanol with stirring at room temperature for 12 hours. **c**: to **4** in THF was added methyl iodide with stirring for 12 hours at room temperature. **d**: HBr in glacial acetic acid with stirring for 30 minutes at room temperature. **e**: to **2**, HOBT, and DIC in CH₂Cl₂ was added **6** and triethylamine in DMF with stirring for 24 hours. **f**: **7** in CH₂Cl₂ was added to Et₃SiH and anhydrous CF₃COOH with stirring at room temperature for 3 hours.--

Attorney Docket No.: RO0006US.NP
Inventors: Sheu et al.
Serial No.: 10/580,803
Filing Date: November 24, 2006
Page 5

Please replace the paragraph beginning at line 16 of page 6 with the following rewritten paragraph:

--[0017] Figure 7 demonstrates that N-acetyl-L-cysteine choline ester (mNAC) improves post-ischemic ~~recovery~~ recovery in rat heart. Male Sprague-Dawley rat hearts were retrograde (Langendorff) perfused with oxygenated Krebs Henseleit (KH) buffer in constant flow mode (12 mL/min/gram wet weight). Hearts were not electrically stimulated, and beat spontaneously at approximately 280 bpm. Left-ventricular pressure (LVP) was measured by a balloon inserted in the left ventricle, linked to a pressure transducer with digital recording at 500 Hz. Traces are shown with the X-axis (time) compressed. Following an equilibration period of approximately 25 min., global normothermic ischemia was imposed for 25 min., followed by reperfusion for 30 min as indicated by the arrows on the traces. For mNAC treatment, the drug was dissolved in KH buffer and infused via a port just above the aortic perfusion cannula, at a final concentration of 50 μ M, for 10 min. prior to the onset of ischemia. Overall recovery of LV developed pressure (systolic minus diastolic) was 4.1% for control, and 15.7% for mNAC treated. It is also apparent that mNAC appeared to delay the onset of ischemic contracture (open arrow).--